the operations in which they are engaged, that they are altogether unlikely to consider questions of utility; nor, indeed, is it desirable that they should. The evolution of processes and methods by means of which the complex existence of the present day is maintained is largely the result of specialization or the division of labor. In such a scheme there is room for those who never demand more of a fact than that it be a fact, of truth that it be truth. But even among scientific men the number of such is small, and as a class they can never be very closely in touch with the people.

Strong to imitate, even in those characteristics which are akin to weakness, many persons of lesser note affect a contempt for the useful and the practical which does not tend to exalt the scientific man in the opinion of the public. Even the great leaders in science have been misrepresented in this matter. Because they wisely determined in many instances to leave to others the task of developing the practical applications of their discoveries, it has often been represented that they held such applications as unworthy a true man of science. As illustrating the injustice of such an opinion, one may cite the case of the most brilliant philosopher of his time, Michael Faraday, who, in the matter of his connection with the Trinity House alone, gave many of the best years of his life to the service of his fellowmen. The intensely "practical" nature of this service is shown by the fact that it included the ventilation of lighthouses, the arrangement of their lightning-conductors, reports upon various propositions regarding lights, the examination of their optical apparatus, and testing samples of cotton, oils, and paints. A precisely similar illustration is to be found in the life of our own great physicist, Joseph Henry, who sacrificed a career as a scientific man, already of exceptional brilliancy, yet promising a future of still greater splendor, for a life of unselfish usefulness to science and to his countrymen as secretary of the Smithsonian Institution, as a member of the Lighthouse Board, and in other capacities for which he was especially fitted by nature as well as by his scientific training.

There is an unfortunate, and perhaps a growing, tendency among scientific men to despise the useful and the practical in science; and it finds expression in the by no means uncommon feeling of offended dignity when an innocent layman asks what is the use of some new discovery.

[Continued on p. 232.]

NOTES AND NEWS.

AN important experiment has been made in the province of the Don Cossacks, Russia, by M. Sherebzov. He collected the water from rain and the melting of the snows into two pools, holding together about 1,872,000,000 cubic feet, and distributed it among the fields in spring and summer. These pools supplied sufficient water to irrigate more than 2,290 acres, but were unable to contain all the water which flowed towards them; and therefore two new pools have been made, and the irrigated area enlarged to 2,960 acres. In consequence of this irrigation, says *The Scottish Geographical Magazine*, the wheat-crop has increased from about 9½ to 15½ bushels per acre; and the profits of the undertaking have been, according to M. Sherebzov, 30 per cent.

— Nothing in the wonderful history of photographic progress, which has been so strikingly rapid during the past few years, has been of greater importance than the development of what may be called, for want of a better term, "the photo-mechanical processes," which are so largely superseding wood engraving, steel engraving, and other pictorial methods. This subject is of great interest to the whole public, but particularly to all persons in any way interested in the production or use of pictorial illustrations: such as artists; authors; publishers of books, magazines, and newspapers; printers; and manufacturers whose products require illustration. For the past few years these processes have multiplied in number, have improved greatly in their results, and are every day assuming greater importance in both artistic and economical directions; yet it is a remarkable fact that in no exhibition have they been brought together for comparison and study. Beginning Nov. 3, 1890, the New York Camera Club will give an exhibition in its rooms, 314 Fifth Avenue, of the work of the various establishments producing all classes of such plates.

— Attention was drawn some months ago by *Engineering* to the very interesting experiments of Messrs. Mach and Salcher, who succeeded in photographing bullets in their flight. These experiments have been repeated with larger weapons, and the results previously obtained fully confirmed. To obtain a photograph, the camera is arranged at one side of the line of fire; and, as the shot passes a fixed point, it causes the discharge of a Leyden jar, the light from which is sufficient to allow of a photograph being taken. No results of any importance are obtained, according to *Engineering* of Oct. 3, till the velocity of the shot exceeds that of sound. But at higher speeds than this the photographs show that a wave of compression precedes the bullet in its flight. The shape of this wave is an hyperboloid of revolution with the apex of the hyperbola some little distance in front of the shell. Behind the shot a conical wave is formed, the angle of which is less, the greater the velocity of the shot. If the semi-vertical angle of this cone is a, the velocity of the shot is said to be

$$\frac{\text{velocity of sound in air}}{\sin a}.$$

— The greatest enemy to the plum is the insect commonly known as the plum curculio. This is the cause of the wormy fruit that so often falls from the trees. Various remedies have been tried for this pest, and for several years trials have been made at the Ohio Experiment Station of the method of killing the insects by spraying with a very dilute mixture of Paris-green and water. The experiments were again repeated this season by the station entomologist, Dr. C. M. Weed, with good results. An orchard of 900 bearing trees in Ottawa County, O., right in the heart of a great fruit growing region, was selected for the experiment. In the north half of it the method of catching the curculios by jarring on a sort of inverted umbrella mounted on wheels was employed, while the south half was sprayed four times with pure Paris-green mixed with water, in the proportion of four ounces to fifty gallons of water. The first application was made May 8, just after the blossoms had fallen from the late-blooming varieties. There was a heavy rain the same night, and it rained almost continuously until May 15, when there was a short cessation. The second spraying was done on that day. The third spraying was made May 26; and the fourth and last, June 2. On the jarred portion of the orchard a great many curculios were caught, showing that they were present in numbers. A careful examination of both parts of the orchard was made on June 3. Between one and two per cent of the fruit on the sprayed trees had been stung, while about three per cent of the plums on the jarred trees were injured. No damage to the trees was then perceptible. Early in July the orchard was again examined. Some of the sprayed trees showed that the foliage had been damaged by the spraying, but the injury was not very serious. Not over three per cent of sprayed fruit was stung at that time, while about four per cent of that on the jarred trees was injured. But on both the fruit was so thick that artificial thinning was necessary to prevent overbearing. A large crop of fruit was ripened on both parts of the orchard, and, so far as could be judged from the experiment, the practicability of preventing the injuries of the plum curculio by spraying was demonstrated. This process is very much less laborious and costly than jarring; and, if future experience is as successful as this season's work, plum-growing will become much easier.